

# LTA-xxV6 Series

***Precision Long-Travel & High-Speed  
Motorized Actuators***



**Newport®**  
Experience | Solutions

## USER'S MANUAL

# Warranty

Newport Corporation warrants this product to be free from defects in material and workmanship for a period of 1 year from the date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's discretion.

To exercise this warranty, write or call your local Newport representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

## Limitation of Warranty

This warranty does not apply to defects resulting from modification or misuse of any product or part.

---

### CAUTION

**Warranty does not apply to damage resulting from:**

- **Incorrect usage of the actuator:**
    - **Driven load greater than maximum specified load.**
    - **Actuator speed higher than specified speed.**
    - **Improper grounding.**
      - ↳ **Connectors must be properly secured.**
      - ↳ **When the driven load represents an electrical risk, it must be connected to ground.**
    - **Excessive or improper driven loads.**
  - **Modification of the actuator or any part.**
- 

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages.

No part of this manual may be reproduced or copied without the prior written approval of Newport Corporation.

This manual has been provided for information only and product specifications are subject to change without notice. Any changes will be reflected in future printings.

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# EC Declaration of Conformity

## **LTA-HLV6 LTA-HSV6**

### **Precision Long-Travel & High-Speed Motorized Actuators**



We declare that the accompanying product, identified with the “CE” mark, meets all relevant requirements of Directive:

- 73/23/CEE, for Low Voltage Compatibility.
- 89/336/EEC for Electromagnetic Compatibility.

Compliance was demonstrated to the following specifications:

#### **EMISSION:**

Radiated and Conducted Emission in accordance with relative prescription to the EMC, NF EN61326-1: Standards for measurement, lab and control equipment.

#### **IMMUNITY:**

Radiated and Conducted Immunity in accordance with relative prescription to the EMC, NF EN61326-1: Standards for measurement, lab and control equipment.

#### **SAFETY:**

CEI 1010-1, safety standards for measurement, lab and control equipment.

A handwritten signature in black ink, appearing to read 'Alain', with a long horizontal stroke extending to the right.

Alain DANIELO  
Vice-President & General Manager  
Newport ISTD Europe  
Zone Industrielle  
45340 Beaune-la-Rolande, France

# Warnings



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## WARNING

The translation of objects of all types carries potential risks for operators. Ensure the protection of operators by prohibiting access to the dangerous area spotted with the opposite symbol, and by informing the personnel of the potential risks involved.

---

## WARNING

Do not use this actuator when its motor is emitting smoke or is unusually hot to the touch or is emitting any unusual odor or noise or is in any other abnormal state.

Stop using the actuator immediately, switch off the motor power and then disconnect the electronics power supply.

After checking that smoke is no longer being emitted contact your Newport service facility and request repairs. Never attempt to repair the actuator yourself as this can be dangerous.

---

## WARNING

Take care that this actuator is not exposed to moisture and that fluid does not get into the actuator.

Nevertheless, if any fluid has entered the actuator, switch off the motor power and then disconnect the electronics from power supply.

Contact your Newport service facility and request repairs.

---

## WARNING

Do not insert or drop objects into this actuator, this may cause an electric shock, or lock the drive.

Do not use this actuator if any foreign objects have entered the actuator. Switch off the motor power and then disconnect the electronics power supply.

Contact your Newport service facility for repairs.

---

## WARNING

Do not place this actuator in unstable locations such as on a wobbly table or sloping surface, where it may fall or tip over and cause injury.

If this actuator has been dropped or the case has been damaged, switch off the motor power and then disconnect the electronics power supply.

Contact your Newport service facility and request repairs.

---

## WARNING

Do not attempt to modify this actuator; this may cause an electric shock or downgrade its performance.

---

## WARNING

Do not exceed the usable depth indicated on the mounting holes (see section “Dimensions”). Longer screws can damage the mechanics or cause a short-circuit.

---

# Cautions

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## CAUTION

Do not place this actuator in a hostile environment such as X-Rays, hard UV,... or in a vacuum environment less than  $10^{-6}$  hPa.

---

## CAUTION

Do not place this actuator in a location affected by dust, oil fumes or steam. This may cause an electric shock.

---

## CAUTION

Do not leave this actuator in places subject to extremely high temperatures or low temperatures. This may cause an electric shock.

- Operating temperature: +10 to +35 °C.
  - Storage temperature: -10 to +40 °C (in its original packaging).
- 

## CAUTION

Do not move this actuator if its motor power is on.

Make sure that the cable to the electronics is disconnected before moving the actuator. Failure to do so may damage the cable and cause an electrical shock.

---

## CAUTION

Be careful that the actuator is not bumped when it is being carried. This may cause it to malfunction.

---

## CAUTION

When handling this actuator, always unplug the equipment from the power source for safety.

---

## CAUTION

When the carriage is in end-of-run position, it is strongly recommended not to go beyond this point by using the manual knob as this may damage the actuator mechanism.

---

## CAUTION

Contact your Newport service facility to request cleaning and specification control every year.

---





# Precision Long-Travel & High-Speed Motorized Actuators

## LTA-xxV6 Series

### 1.0 Introduction

This manual provides operating instructions for the actuator that you have purchased in the LTA-xxV6 Series:

- LTA-HLV6
- LTA-HSV6



*LTA-HLV6 (down) and LTA-HSV6 (up) motorized actuators.*

#### RECOMMENDATION

We recommend you to read attentively the chapter “Connection to electronics” before LTA-xxV6 actuator using.



*The LTA-xxV6 Series actuator is compatible with most standard Newport manual stages and opto-mechanical components like the (M-)436 Series translation stage.*

## 2.0 Description

The LTA-xxV6 actuators provide up to 50 mm motorized travel in a compact package. They are designed to fit into your existing manual stages and other opto-mechanical components as a direct replacement for manual micrometers.

The LTA-xxV6 series features a space-saving design with the motor and lead screw side-by-side. This cuts the actuator length in half and minimizes the negative effects of long cantilever loads on micro-positioning equipment. The non-rotating tip furthermore prevents wear and avoids periodic motion variations which can be caused by variable contacts made between a rotating tip and the mating surface.

Precision motion is accomplished by a miniature DC servo motor with an optimized output torque. This allows for faster motion with higher load capacity. The LTA-HLV6 is especially recommended for heavy load applications. It features a stronger 8 mm diameter rod and a M12 x 0.5 mounting bezel that is compatible with our UMR8V6 and MVN80V6 linear stages and SKV6 and SLV6 series optical mounts. The LTA-HSV6 is optimized for high-speed applications and provides the longer travel range. The mounting interface of the LTA-HSV6 is compatible with a large number of Newport and others manual components.

A movable limit switch prevents equipment from over-travel. Its position can be changed in minutes to adjust the max. travel position. A manual adjustment knob permits quick and intuitive positioning of the actuator while the motor is off. Convenient marked scales indicate coarse actuator position in both millimeters and inches.

For optimal performance, we recommend the use of our motion controllers.

LTA-xxV6 actuators are equipped with a cable of 1.5 m length and a 25-pin sub-D connector for connection to our motion controllers.

### 2.1 Design Details

Base Material	Stainless steel body with aluminum cover
Drive Mechanism	Non-rotating lead screw (rotating nut)
Drive Screw Pitch (mm)	1.0
Reduction Gear	HL Version 1:66 HS Version 1:14
Feedback	Motor mounted rotary encoder, 2048 cts/rev.
Limit Switches	Mechanical switches, both ends, max. travel limit is adjustable
Origin	Uses minimum travel limit for homing, typically < 4 µm repeatability
Motor	UE1724SR
Cable Length (m)	1.5
Vacuum Compatibility	up to 10 <sup>-6</sup> hPa
MTBF	10,000 h at 25 N load and a 10% duty cycle
Weight [lb (kg)]	LTA-HLV6 0.90 (0.41) LTA-HSV6 0.84 (0.38)

<sup>1)</sup> See section: "Setting of the + Limit Switch".

## 3.0 Characteristics

### 3.1 Definitions

Specifications of our products are established in reference to ISO 230 standard part II “Determination of the position, precision and repeatability of the machine tools with CNC”.

This standard gives the definition of position uncertainty which depends on the 3 following quantities:

#### **(Absolute) Accuracy**

Difference between ideal position and real position.

#### **On-Axis Accuracy**

Difference between ideal position and real position after the compensation of linear error sources.

Linear errors include: cosine errors, inaccuracy of screw or linear scale pitch, angular deviation at the measuring point (Abbe error) and thermal expansion effects. All Newport motion electronics can compensate for linear errors.

The relation between absolute accuracy and on-axis accuracy is as follow:

$$\text{Absolute Accuracy} = \text{On-Axis Accuracy} + \text{Correction Factor} \times \text{Travel}$$

#### **Repeatability**

Ability of a system to achieve a commanded position over many attempts.

#### **Reversal Value (Hysteresis)**

Difference between actual position values obtained for a given target position when approached from opposite directions.

#### **Minimum Incremental Motion (Sensitivity)**

The smallest increment of motion a device is capable of delivering consistently and reliably.

#### **Resolution**

The smallest increment that a motion device can be commanded to move and/or detect.

The testing of on-axis accuracy, repeatability, and reversal error are made systematically with our test equipment in an air-conditioned room (20 °C ±1 °C).

Each rotation stage is tested with a precision optical encoder.

A linear cycle with 21 measures on the travel and 4 cycles in each direction gives a total of 164 points.

### 3.2 Mechanical Specifications

	LTA-HSV6	LTA-HLV6
Travel (mm)	50	25
Resolution ( $\mu\text{m}$ )	0.035	0.0074
Minimum Incremental Motion ( $\mu\text{m}$ )	0.1	0.05
Uni-directional Repeatability ( $\mu\text{m}$ )	0.15 typical, 0.5 guaranteed	0.15 typical, 0.5 guaranteed
Bi-directional Repeatability ( $\mu\text{m}$ )*	0.6 typical, 2 guaranteed	0.6 typical, 2 guaranteed
On-Axis Accuracy ( $\mu\text{m}$ )	5 typical, 15 guaranteed	2 typical, 8 guaranteed
Maximum Speed (mm/s)	2.5	0.5
Axial Load Capacity (N)**	25	60
Side Load Capacity**	2.5	10

\* After backlash compensation. Backlash compensation value provided with each actuator.

\*\* Avoid side loads during motion.

#### CAUTION

Values in the table above are indicated for actuators operating with the rod in  $-C_x$  direction.

### 3.3 Axial Load Capacity

Maximum load an actuator can move while maintaining specifications. This value is given with speed and acceleration specified for the actuator.

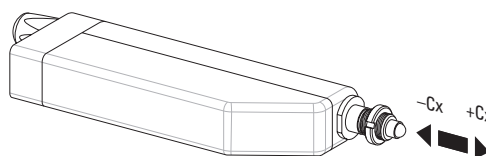
		LTA-HSV6	LTA-HLV6
Specified Speed	(mm/s)	2.5	0.5
Specified Acceleration	(mm/s <sup>2</sup> )	10	2

This value is given for load along the direction of the motion.

		LTA-HSV6	LTA-HLV6
$-C_x$	(N)	25	60
$+C_x$	(N)	20	50

#### CAUTION

Do not apply alternatively  $+C_x$  and  $-C_x$  loads during an operating cycle.



### 3.4 Minimal Axial Load

#### CAUTION

To reach the specifications stated for LTA-xxV6 actuators, a minimum axial load must be applied at the end of the rod.

		LTA-HSV6	LTA-HLV6
Min. $\pm C_x$	(N)	2.5	5

3.5 Actuator Weight

Weights indicated are values for actuators with their cable.

LTA-HSV6	[lb (kg)]	0.84 (0.38)
LTA-HLV6	[lb (kg)]	0.90 (0.41)

4.0 Drive

4.1 DC-Motor Drive

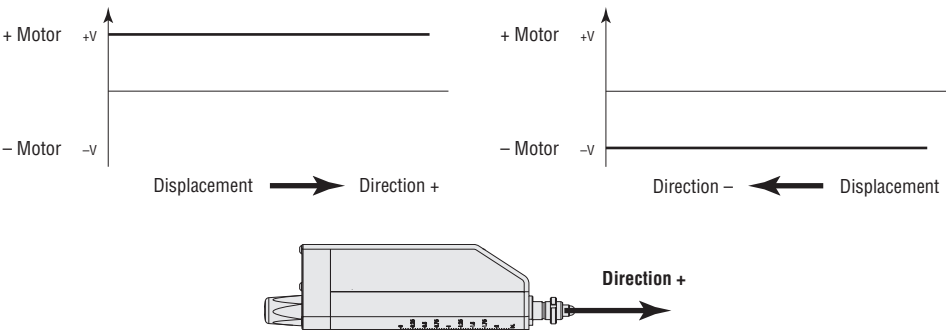
	Resolution (μm)	Speed (mm/s)	Motor
LTA-HSV6	0.035	2.5	UE1724SR
LTA-HLV6	0.0074	0.5	

5.0 Motor

5.1 DC-Motor Characteristics

Motor	Nominal Voltage (V)	Max. Current (A)	Resistance (Ω)	Inductance (mH)
UE1724SR	24	0.2	54.6	1.19

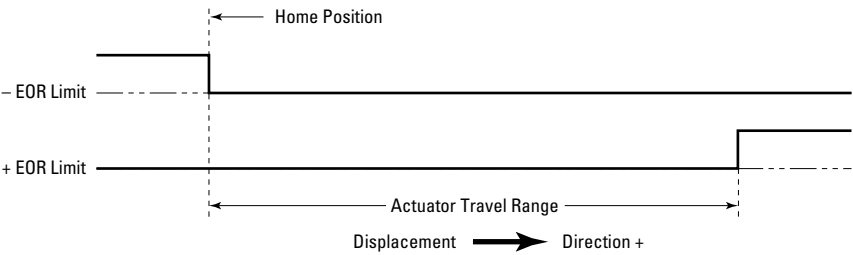
5.2 Command Signals for the DC-Motor



In the above drawings, + Motor signal is referred to – Motor signal.

- ❶ When the actuator moves in + Direction, the + Motor voltage is higher than – Motor voltage.
- ❷ When the actuator moves in – Direction, the + Motor voltage is lower than – Motor voltage.

5.3 Sensor Position

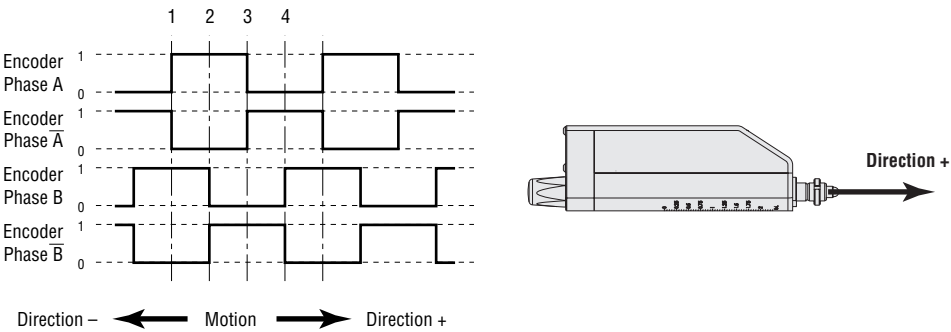


End-of-Run are TTL type: 5 V  $\pm$ 5%, 2 mA max.

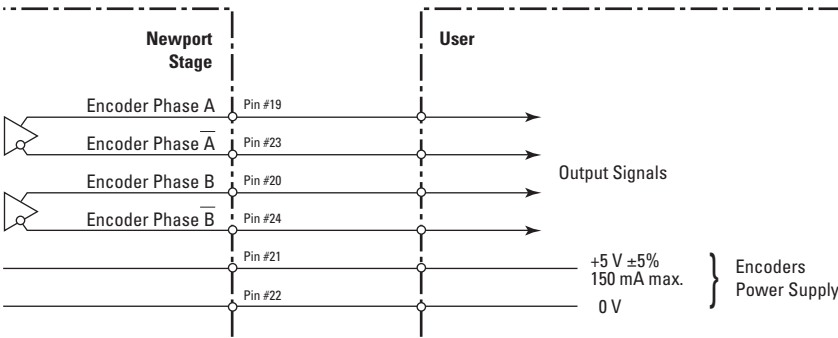
CAUTION

“End-of-Run” are active signals and should not be connected to any other source. Use appropriate TTL type receivers.

5.4 Feedback Signal Position



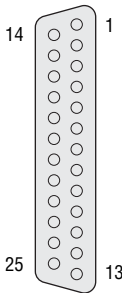
The incremental sensor consists of a optical scale and an encoder head. When the sensor shaft turns, the encoder head generates square signals in quadrature, sent to pins #19, #20, #23 and #24 of the 25-pin Sub-D connector.



Encoders are “differential pair” (type RS422) type output signals. Using these signals permits a high immunity to noise. Emission circuits generally used by Newport are 26LS31 or MC3487. Reception circuits to use are 26LS32 or MC3486 respectively.

5.5 Pinouts

The 25-pin Sub-D connection for LTA-xxV6 actuators is given in the following table:

UE1724SR				
LTA-HSV6 & LTA-HLV6				
	<b>1</b>	N.C.	<b>14</b>	Shield Ground
	<b>2</b>	N.C.	<b>15</b>	N.C.
	<b>3</b>	N.C.	<b>16</b>	0 V logic
	<b>4</b>	N.C.	<b>17</b>	+ End-of-Run
	<b>5</b>	+ Motor	<b>18</b>	– End-of-Run
	<b>6</b>	+ Motor	<b>19</b>	Encoder Phase A
	<b>7</b>	– Motor	<b>20</b>	Encoder Phase B
	<b>8</b>	– Motor	<b>21</b>	Encoder Power: +5 V
	<b>9</b>	N.C.	<b>22</b>	0 V Encoder
	<b>10</b>	N.C.	<b>23</b>	Encoder Phase /A
	<b>11</b>	N.C.	<b>24</b>	Encoder Phase /B
	<b>12</b>	N.C.	<b>25</b>	N.C.
	<b>13</b>	N.C.		

## 6.0 Connection to Newport Controllers

### 6.1 Warnings on Controllers

Controllers are intended for use by qualified personnel who recognize shock hazards and are familiar with safety precautions required to avoid possible injury. Read the controller user's manual carefully before operating the instrument and pay attention to all written warnings and cautions.

---

#### WARNING

Disconnect the power plug under the following circumstances:

- If the power cord or any attached cables are frayed or damaged in any way.
- If the power plug is damaged in any way.
- If the unit is exposed to rain, excessive moisture, or liquids are spilled on the unit.
- If the unit has been dropped or the case is damaged.
- If you suspect service or repair is required.
- Whenever you clean the electronics unit.

---

#### CAUTION

To protect the unit from damage, be sure to:

- Keep all air vents free of dirt and dust.
- Keep all liquids away from the unit.
- Do not expose the unit to excessive moisture (85% humidity).
- Read this manual before using the unit for the first time.

---

#### WARNING

All attachment plug receptacles in the vicinity of this unit are to be of the grounding type and properly polarized.

Contact your electrician to check your receptacles.

---

#### WARNING

This product is equipped with a 3-wire grounding type plug.

Any interruption of the grounding connection can create an electric shock hazard.

If you are unable to insert the plug into your wall plug receptacle, contact your electrician to perform the necessary alterations to ensure that the green (green-yellow) wire is attached to earth ground.

---

#### WARNING

This product operates with voltages that can be lethal.

Pushing objects of any kind into cabinet slots or holes, or spilling any liquid on the product, may touch hazardous voltage points or short out parts.



## 6.2 Connection

On each packaging containing an actuator is represented a label which indicates its name, its serial number and the motor it is equipped with (ex.: UE1724SR).

LTA-HS	SN#
ENCODER:5V	MOTOR:UE1724SR
D.C Motor	U=24VDC I=0.2A

---

### WARNING

**Always turn the controller's power OFF before connecting to an actuator.**

---

Actuators may be connected to the rear panel motor connectors labeled “Motor...” any time prior to power-up with the supplied cable assemblies.

## 6.3 Cables

Our LTA-xxV6 actuators are delivered equipped with a cable with 25-pin Sub-D connector. They can be directly connected to our controllers/drivers.

---

### WARNING

**This cable is shielded correctly. For a correct operation, make sure to lock connectors (ground continuity provided by the cable).**

---

### WARNING

**Keep the motor cables at a safe distance from other electrical cables in your environment to avoid potential cross talk.**

---

## 7.0 Connection to Non-Newport Electronics

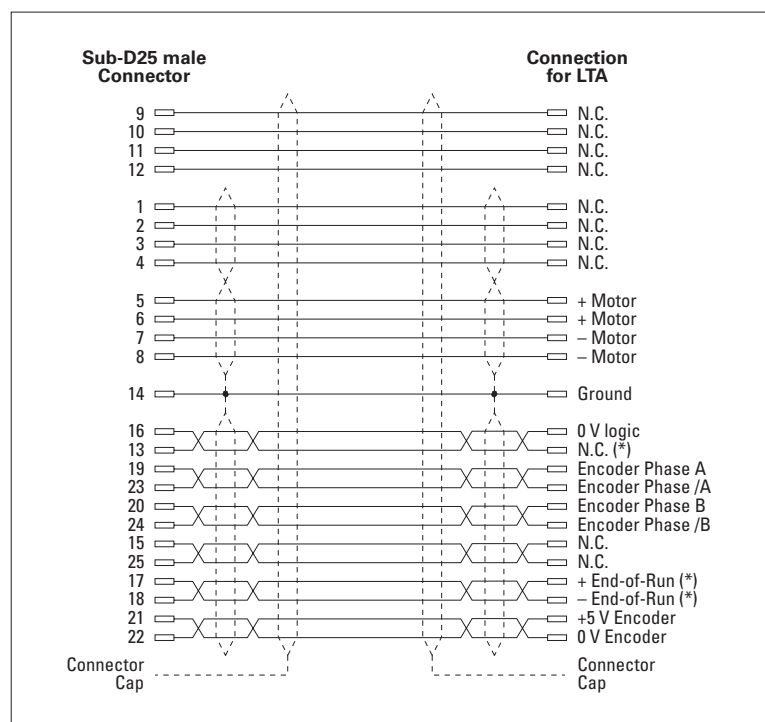
### WARNING

Newport takes no responsibility for improper functioning or damage of a LTA-xxV6 actuator when it is used with any non- Newport electronics.

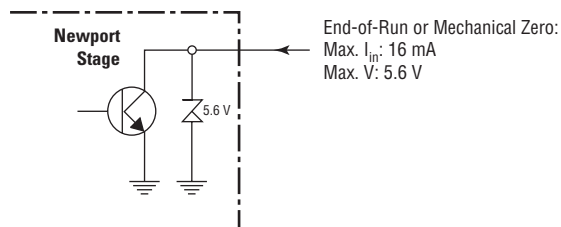
### WARNING

Newport guarantees the "EC" compliance of the LTA-xxV6 Series actuators only if they are used with Newport cables and electronics.

Nevertheless, the figure below indicates the recommended wiring when a LTA-xxV6 actuator is used with non-Newport electronics.



\* Open collector type with a 5.6 V protective Zener diode.



If the "Mechanical Zero" output is not used, a 1 k $\Omega$ /0.25 W resistor must be connected between pins #13 and #21.

"Encoder" and "Index Pulse" are "differential pair" type output signals. Using these signals permits a high immunity to noise. Emission circuits generally used by Newport are 26LS31 or MC3487. Reception circuits to use are 26LS32 or MC3486.

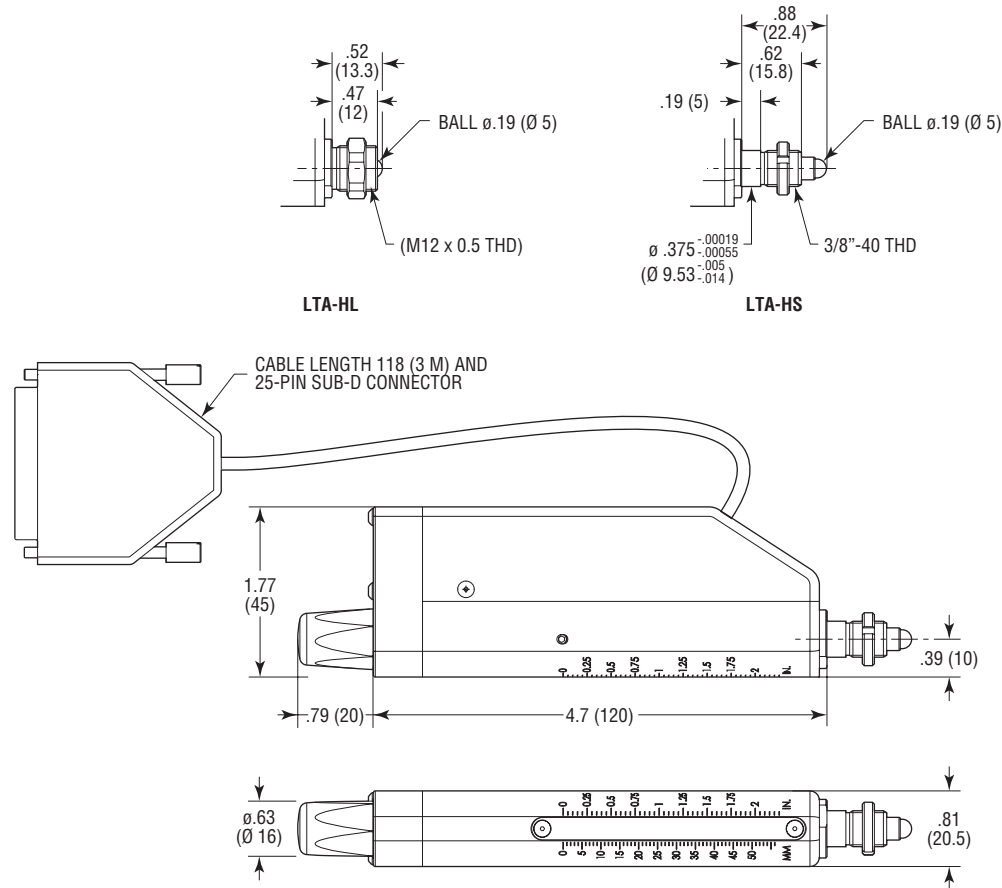
### WARNING

Maximum characteristics used for "CE" compliance:

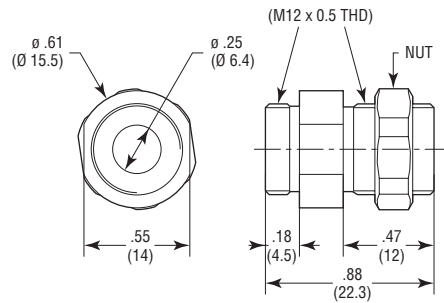
- UE1724SR DC-Motor: 24 V / 0.9 A peak-to-peak

8.0 Dimensions

8.1 LTA-HLV6 & LTA-HSV6 Actuators



8.2 LTA-M12V6 Adapter for LTA-HSV6 Actuator



## 9.0 Setting of the Travel Range

### WARNING

**The actuator must be disconnected from any controller before setting the + limit switch.**

- ❶ Remove the glass cover unscrewing with an Allen key both screws, located on each side.



- ❷ Note the position of the absolute position indicator.



- ❷ Unscrew slightly the screw of the travel range indicator.



Move the travel range indicator until the needed position respecting the following rule:

**LTA-HSV6** needed position =  
 $55 + \text{absolute position noted} - \text{travel range needed}$

**LTA-HLV6** needed position =  
 $30 + \text{absolute position noted} - \text{travel range needed}$

For example, for a LTA-HSV6 stopped at an absolute position equal to 13 mm and for a needed travel range of 50 mm, the travel range indicator must be set at:  $55 + 13 - 50 = 18 \text{ mm}$ .

- ④ Lock this screw in position. The travel range is set.



- ⑤ Put back the glass cover and fix it with both screws.

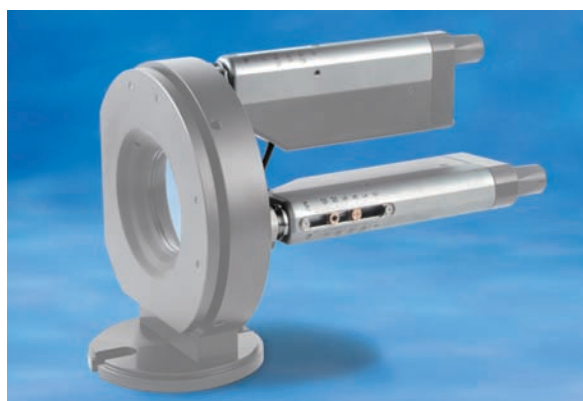
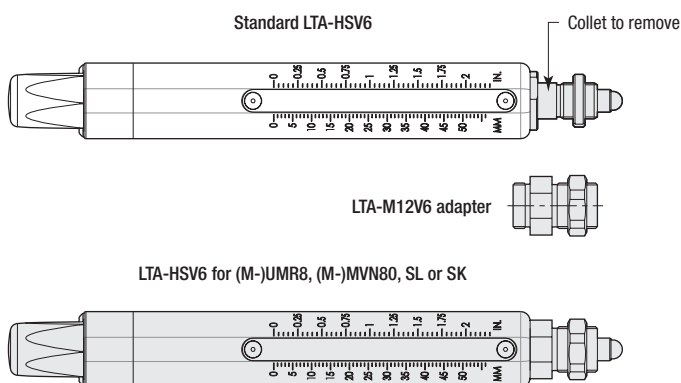


- ⑥ You can now use the LTA-xxV6 actuator with a new travel range.

## 10.0 Adapter Mounting for LTA-HSV6

When you have to fix a LTA-HSV6 actuator on a (M-)UMR-8V6 or (M-)MVN80V6 stage or on a SKV6 or SLV6 optical mount, you must use the LTA-M12V6 adapter.

To do that, you have to remove the collet delivered with the LTA-HSV6 and put the adapter instead.



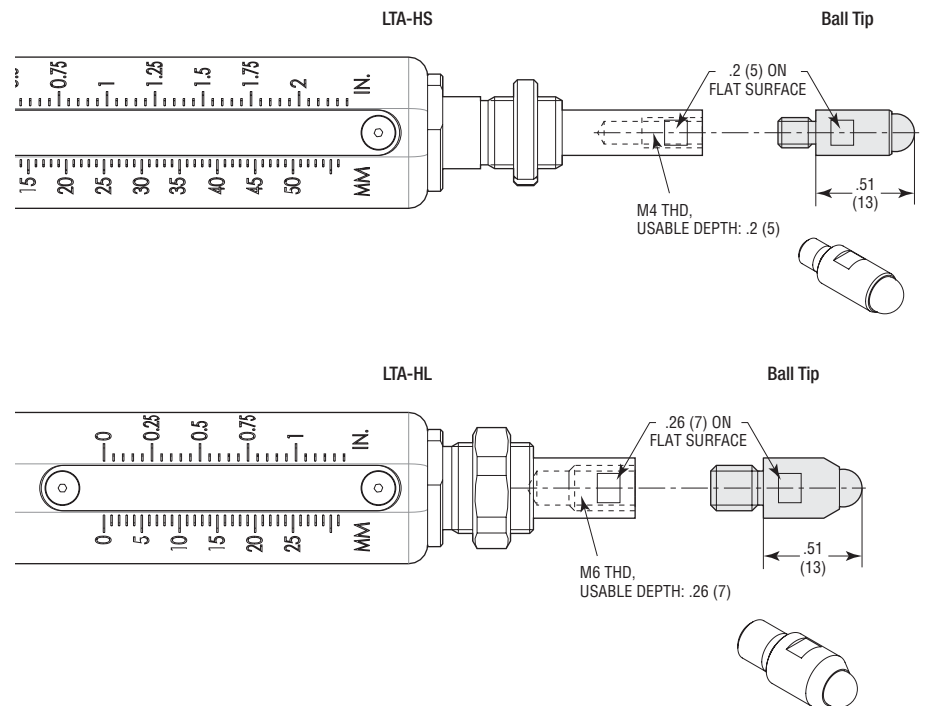
*SL50V6 optical mount with LTA-HSV6 actuators.*

## 11.0 Dismantling of the Ball Tip

### WARNING

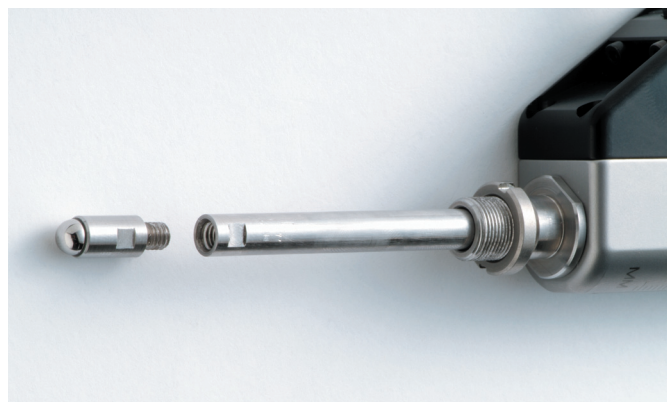
The actuator must be disconnected from any controller before dismantling of the ball tip.

If you dismantle the ball tip at the end of the actuator rod, you will get a M4 (LTA-HSV6) or M6 (LTA-HLV6) threaded interface instead.



To do that, two flat surfaces are available on both actuator rod and ball tip to remove.

Lock the rod actuator with a wrench and unscrew the ball tip with an other one.



*Ball tip of the LTA-HSV6 actuator.*

## 12.0 Maintenance

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### RECOMMENDATION

**It is recommended to contact our After Sales Service which will know to define the appropriate maintenance for your application.**

---

### 12.1 Maintenance

The LTA-xxV6 actuator requires no particular maintenance. Nevertheless, this is a precision mechanical device that must be kept and manipulated with precaution.

---

### PRECAUTIONS

**The LTA-xxV6 actuator must operate, and be stocked in a clean environment, without dust, humidity, solvents or other substances.**

---

### RECOMMENDATION

**It is recommended to return your actuator to our After Sales Service after every 2000 hours of use for lubrication.**

**If your LTA-xxV6 actuator is mounted on a workstation and cannot be easily dismantled, please contact our After Sales Service for further instructions.**

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### 12.2 Repairing

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#### CAUTION

**Never attempt to disassemble an element of the actuator that has not been specified in this manual.**

**To disassemble a non specified element can cause a malfunction of the actuator.**

---

If you observe a malfunction in your actuator, please immediately contact us to make arrangements for a repair.

---

#### CAUTION

**All disassembly attempts or repair of actuator without authorization will void your warranty.**

---

### 12.3 Calibration

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#### CAUTION

**It is recommended to return your actuator to Newport once a year for a recalibration to its original specifications.**

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# Service Form

## Your Local Representative

Tel.: \_\_\_\_\_

Fax: \_\_\_\_\_

Name: \_\_\_\_\_

Return authorization #: \_\_\_\_\_

(Please obtain prior to return of item)

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Date: \_\_\_\_\_

Country: \_\_\_\_\_

Phone Number: \_\_\_\_\_

P.O. Number:

P.O. Number: Fax Number:

**Item(s) Being Returned:**

Model #: \_\_\_\_\_

Serial #: \_\_\_\_\_

Description: \_\_\_\_\_

Reasons of return of goods (please list any specific problems): \_\_\_\_\_

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